

## MESAL SURFACE—LEFT SIDE.

The *calloso-marginal fissure* ran its usual course to form the anterior boundary of the præcuneus. It was broken in the last part at the præcuneus by a convolution.

Above this fissure was a *secondary fissure*, running parallel to it and ending about opposite the first third of the corpus callosum.

## MESAL SURFACE—RIGHT SIDE.

The *calloso-marginal fissure* was continued on through the præcuneus to the parieto-occipital fissure, from which it was separated by a small convolution.

The *secondary fissure* upon this side was still more developed than on the left, and ran back to the anterior boundary of the paracentral lobule.

On the whole it would appear (1) that the brain was marked by an unusual number of cross and secondary fissures, especially in the frontal lobes; (2) that it was not of the confluent fissure type; (3) that the convolutions on the two hemispheres were quite asymmetrical.

## THE INTERIOR OF THE BRAIN.

The white substance was somewhat whiter than usual, and of normal consistency.

The gray cortex was measured and seemed to be somewhat thinner than usual. Eight or nine measurements in different parts gave a thickness varying between  $\frac{1}{8}$ ,  $\frac{1}{6}$ ,  $\frac{1}{8}$ ,  $\frac{1}{6}$  of an inch.

The *ventricles* were dry, the *ependyma* normal, the *choroid plexus* showed nothing noticeable. No spots of hemorrhage or softening were found, and no tumor was present.

## THE CEREBELLUM.

Nothing peculiar was noted regarding this portion of the brain.

The brain was finally cut into various pieces.

Portions were distributed for microscopic examination.

## MICROSCOPIC EXAMINATION OF GUILTEAU'S BRAIN. CHANGES IN ITS ORGANISM DENOTING INITIAL DEMENTIA PARALYTICA.

The following is the official report of the microscopical examination of the brain of Charles J. Guiteau, who died by hanging June 30, 1882, at the United States Jail, Washington, D. C., in execution of judicial sentence, published in the *Medical News* of Sept. 9, 1882.

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D. S. LAMB, M.D.

SIR: The committee of three whom you, with the assent of Rev. Dr. W. W. Hicks, requested to make a careful microscopical examination of sections from the brain, dura mater, and lung of the late Charles J. Guiteau, and to report the conditions found to be present, have completed their investigation, and have agreed upon the following report:

Thin sections, prepared by Dr. J. C. McConnell, of the Army Medical Museum, from the lung, dura mater, and brain, were submitted to your committee for their inspection.

The committee regret that the preparations presented did not more completely represent the whole brain and its membranes.

*The lung.*—The sections of lung were from the left upper lobe, Their appearances were common to miliary tubercle. Some of the minute nodules consisted of aggregations of recently formed miliary tubercles in which giant-cells were quite distinct. Others contained older foci of similar aggregations which had undergone corneous degeneration.

Considerable pigmentation of the pulmonary parenchyma, very like that of anthracosis, was also to be seen.

*Dura mater.*—The sections of dura mater were from the region of the middle meningeal artery. They showed but few, if any, signs of inflammatory action, and there was not much thickening evident.

*Brain.*—The brain sections comprised the following series, viz. : sections from two portions of the *corpus striatum*, marked respectively corpus striatum 1, corpus striatum 2 ; and sections from four portions of the gray matter of the convexity or cortex of the cerebrum, labelled respectively frontal region, convexity 1, convexity 2, convexity 3. Those from the frontal region were probably from the superior frontal convolution, whilst those marked convexity 1, 2, and 3, were cut respectively from the ascending frontal, the ascending parietal, and the superior parietal convolutions bordering upon the median longitudinal fissure, but the committee were not informed from which hemisphere.

A close examination of these sections, under a high power of the microscope, revealed the lesions noted below :

*Corpus striatum 1.*—Not a few of the blood-vessels, particularly capillaries and venules, were decidedly abnormal. Their perivascular lymph-spaces were often more or less completely filled with masses of yellowish brown pigment granules, which appeared to be the degenerated remains of old blood extravasations.

In areas very numerous but mainly limited to the gray or ganglionic substance, the capillary blood-vessels presented their walls in a state of granular degeneration. Sometimes these granules were limited within the endothelial cells, constituting the wall of the capillary, but often they were found for a considerable distance completely encircling the vessel.

The lumen of the blood-vessels was usually void of blood corpuscles, and was patulous. A small number of very minute recent hemorrhages were to be seen.

In the gray or ganglionic matter of these sections were quite numerous areas, in which alterations of the neuroglia and of the ganglionic nerve corpuscles were very plainly visible. In them the pericellular lymph-spaces were much crowded with lymphoid elements. In some areas the whole space seemed to be occupied by collections of such cells, no trace of the neuroglia cell or nerve corpuscle remaining. Most frequently, however, neither the encompassed nerve corpuscle nor the neuroglia cell was destroyed. On the contrary, their nuclei and branched processes were generally distinct. Yet in many cases the body of the cells was extensively tinged with a yellowish-brown pigment, and, in a smaller number of cells, the presence of well-defined, dark granules in the cell-body was sufficient to mask entirely the nucleus, if any existed. Moreover, in the latter case, the cell processes were sometimes much less numerous than normal, and the body of the cell was not so angular.

*Corpus striatum 2.*—In these sections, the neuroglia and nerve corpuscles were found to be in much the same condition as above noted.

In a general way it may be stated that the cellular hyperplasia or cell multiplication was more marked than in No. 1.

With respect to the lesions of the blood-vessels, two departures from health were noteworthy. Instead of those lesions consisting of the remains, in the perivascular lymph-spaces, of blood extravasations, as in the first sections examined, these spaces at points along the course of the vessel were often found crowded with lymphoid elements. In some instances, these white cells were clustered closely around and adherent to the wall of the vessel upon its exterior, and often most abundantly aggregated in the immediate vicinity of a bifurcation. In others the cells were closely packed together upon the external wall of the perivascular lymph-space and slightly infiltrated the adjacent neuroglia.

In the white fibrous nerve substance there were isolated bundles of nerve fibres and collections of such bundles, easily distinguished from the others by the presence, in greatly increased numbers, of cell elements upon and between them. Under a high power of the microscope, these elements were found to be outside the capillary blood-vessels, and to occupy the same relation to the nerve bundles and to the vessels, and to present the same general microscopic picture as that seen in longitudinal sections of the optic nerve in a descending optic neuritis.

The areas of diseased structures above mentioned were more or less diffusely scattered among tissues in which nothing distinctly abnormal could be made out.

*Cerebral cortex. Frontal region.*—The first layer seemed to be thinned almost to nothing in spots at the convexity of the convolution. The depths corresponding to these spots were, perhaps, a little more hypercellular than other portions. In the second, fourth, and fifth layers, especially in the two latter, the blood-vessels presented, in a marked degree, degenerations similar to those remarked in the corpus striatum.

In the second, fourth, and fifth layers, the pericellular spaces, both of the neuroglia cells and of the ganglionic corpuscles, were more or less filled with lymphoid cells. In these layers some ganglion nerve cells were also quite freely pigmented. Sometimes one half the body of the cell was densely packed with pigmented granules to such an extent as to veil the nucleus, but the latter as well as the enclosed nucleolus even then could generally be discerned, although with difficulty.

This cellular hyperplasia was much more marked in the fourth and fifth layers than elsewhere, and was pretty uniform throughout them, yet even here there was an obvious tendency to distribution *en plaques*.

In the subjacent white nerve fibrous substance, the vessels were also sometimes slightly altered, and a few examples of cellular hyperplasia along the nerve bundles, much as was described for the corpus striatum, were rarely seen.

But few recent hemorrhages were visible in the sections examined.

*Convexity Nos. 1, 2, 3.*—The same abnormal appearances were remarked in all these sections, varying only in degree. It is sufficient to state that they were usually identical with those noted in sections from the frontal region, the only difference worth mentioning being the fact that the areas in which the vessels

offered a granular degeneration were much less numerous and extensive than in the frontal region.

In the foregoing report it is to be assumed that the structures not specially mentioned were found in a condition so nearly normal as to call for no remark.

It should be stated, however, that in these various brain sections numerous so-called minute vacuoles were found. Whether these forms were real cavities or were transparent, highly refractive bodies of a definite constitution which was not revealed by the method of preparation, the committee do not undertake to say. Neither do they, in view of the wide-spread difference of opinion among observers, feel warranted in expressing a positive opinion as to whether or not these so-called vacuoles are to be regarded as *post-mortem* changes.

As bearing somewhat against the assumption of a *post-mortem* origin for such appearances in general, the following facts, besides many other considerations, may be referred to :

1st. They are not constantly found in brains which have been obtained thirty-six or forty-eight hours after death, long after decomposition has set in.

2d. They have not infrequently been found in brains of animals killed for the purpose of experiment, when the nervous tissue has been instantly subjected to the action of the most perfect preservative fluids.

3d. They have been met with when the brain substance has been examined perfectly fresh.

4th. If they are the result of *post-mortem* change, they should not be met with immediately after death, but should appear and increase in number as decomposition advances. Yet no such relation to the time of death and state of decomposition has been observed for them.

In estimating the significance of these vacuoles in Guiteau's brain, it should be remembered that the specimens were obtained and submitted to the action of the preservative agents not more than five or six hours after death, an early period rarely possible with human subjects ; that the microscope showed the elements of the brain well preserved in other respects ; that in some brains examined forty-eight hours after death these appearances are absent, and in others they are often less numerous than they were found to be in this particular brain ; finally, that they were associated with abnormal conditions of the blood-vessels and of the cellular elements of the brain.

In conclusion, your committee have no hesitation whatever in affirming the existence of unquestionable evidence of decided chronic disease of the minute blood-vessels in numerous minute diffused areas, accompanied by alterations of the cellular elements in the specimens of brain submitted for their examination. Whilst the lesions found were most marked in the corpus striatum and in the frontal region of the cerebral cortex, yet they very diffusely pervaded all portions of the brain which the sections represented.

They are of the opinion that all of the lesions to be recognized in the sections placed in their hands have been pointed out in the foregoing report. They regret that it has not been possible to subject the tissues to all the tests which might determine the nature, beyond a peradventure, of the so-called vacuoles referred to.

They have not been called upon to pass upon the bearing the lesions found might have upon the state of the subject's mind, and, therefore, do not offer an opinion.

Respectfully submitted,

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E. O. SHAKESPEARE,  
J. C. MCCONNELL.

September 4, 1882.

Dr. Lamb furnishes the following measurements of Guiteau's skull :

Cranium of a male, age nearly 41.

Internal capacity . . . . .	1530 cc.
Length . . . . .	182 mm.
Breadth . . . . .	144 "
Breadth of frontal . . . . .	97 and 125 "
Height . . . . .	133 "
Index of foramen magnum . . . . .	45 "
Frontal arch . . . . .	290 "
Parietal arch . . . . .	323 "
Occipital arch . . . . .	243 "
Longitudinal arch . . . . .	380 "
Circumference . . . . .	521 "
Length of frontal bone . . . . .	127 "
Length of parietal bone . . . . .	135 "
Length of occipital bone . . . . .	183 "
Zygomatic diameter . . . . .	125 "
Facial angle . . . . .	71°
Skull, mesocephalic.	

#### A FORCED DEDUCTION.

SUMMING up the lesions discovered by the microscopical examination of portions of Guiteau's brain, the *Medical News* (Sept. 9, 1882) says : " They (the lesions) constitute the initial stage of a malady which, in its fullest development, is known as dementia paralytica or an allied disease, the early symptoms of which disorder correspond closely with the mental condition of Guiteau during the past year."

Guiteau was, then, insane, if there is any meaning in language. But the sapient *News* does not think so, and proceeds to eat its own words. Driven to the wall by the stern evidence of the facts, it proceeds to wriggle in this wise : " Mere structural changes of the organic substratum cannot be safely interpreted alone." But the *News* has already interpreted these changes to mean dementia paralytica—a well-recognized form of insanity ;—hence, this eva-